

Abrasion Tester		
S.No.	Specification	
1	Type	Taber Abrader with rotating table
2	Arm Weights	500 grams & 1000 grams
3	Test cycles counter	9999 Nos
4	Confirm to Standards	ASTM D1044
5	Abrading Wheel	Mild to medium action, resilient binder, Aluminum oxide or silicon carbide particles.
6	Grade of Wheel	CS-17, CS-10, H-18, H-22, CS-10F- Each 2 Sets
7	Accessories	Diamond Wheel Refacer to clean the abrasion wheel

Climatic Chamber		
S.No	Specifications	
Interior dimensions		
1	Interior volume (l)	53 or specify
2	Load per shelf (kg)	15
3	Permitted total load (kg)	60
Temperature data		
1	Temperature range (°C)	- 40 to 180
2	Temperature fluctuation (± K)	0,1 - 0,5
3	Recovery time after door was open	30 sec
4	at -10 °C (min.)	5
5	at 70 °C (min.)	1
6	at 150 °C (min.)	5
7	Mean warm-up rate acc. to factory standard (°C/min.) -40 °C to 180 °C	4,6
8	Mean cooling rate acc. factory standard (°C/min.) 180 °C to -40 °C	4,1
9	Heat compensation, max. (W)	500
Humidity data		
1	Humidity range (%)	0-99
Electrical data		
1	IP protection class acc. to EN 50529	IP 20
Temperature and Humidity should be microprocessor based Programmable		
Calibration certificate should be provided from NABL accredited lab		

Glow Wire Tester		
S.No.	Specifications	
1	Heating element	Nickel/Chromium glow-wire (80:20), 4 mm dia, shaped as specified in standards
2	Temperature sensor	Sheathed Cr/Al thermocouple, 0.5 or 1.0 mm dia, located in tight fitting pocket hole in glow-wire
3	Temperature range	Ambient to 999.9°C adjustable
	Temperature precision	± 5°C

4	Max. output power	1000 W
5	Glow wire application time	0.1-999.9 sec
6	Sample loading	Test sample moves against glow-wire preloaded to 1.0 ± 0.2N
	Sample loading	Test sample moves against glow-wire preloaded to 1.0 ± 0.2N
7	Sample carriage	Automatic, motorised movement of test specimen
8	Safety	Emergency stop, PLC interlocks
Machine should comply to IEC 60695		
9	Calibration Certificates should be provided from NABL accredited lab	

Volume and Surface Resistivity Test

Sr.No.	Specification	
1	Test Voltage	10 to 1000 V AC
2	Insulation Resistance Range	10e3 Ohm to 10e 20 Ohm
3	Volume Resistivity Range	1 x 10e20 Ohm cm
4	Surface Resistivity Range	1 x 10e20 Ohm cm
5	Test Jig	As per ASTM D257
Machine should comply to ASTM D 257		
Calibration Certificates should be provided from NABL accredited lab		

Melting Point apparatus (hot stage)

Sr.No.	Specification	
1	Temp Range(Deg. Centigrade)	Ambient to 400° C
2	Operation Grade	Automatic
3	Control System	PLC control
4	Resolution	1 deg C or better
Other required accessories should be provided including magnifying lense		
Calibration Certificates should be provided from NABL accredited lab		

MELT FLOW TESTER

Scope : Determination of flow properties of polymer powders & pellets using ISO 1133 (1991) and ASTM D1238, Method A, B & C and other equivalent International standards.	
TECHNICAL SPECIFICATION:	
➤ System should meet ASTM 1238 and ISO 1133-1-2, DIN 53735, BS 2782, IS 2530	
➤ Temperature range 50 to 400C	
➤ Temperature display resolution: +/- 0.1 C	
➤ Thermal stability: +/- 0.2 C from 50to 400 C	
➤ Thermal fuse protection.	
➤ MVR with up to 40 data points acquisition for a single test (with encoder)	
➤ Barrel Cylinder: Hardened Nitride Steel	
➤ On-board LCD Display with alphanumeric keypad for methods setting and visualization of results.	

➤ Should be equipped with high accuracy encoder and motorized lifting device to allow precise and exact positioning of the lifting device for the masses.	
➤ Automatic Cutting device	
ACCESSORIES:	
- Masses : 1.2, 2.16, 5, 10, 21.6 kg	
- Standard Nozzle as per ISO 1133/ASTM D1238 Diameter 2.095 mm, Length 8 mm,, tungsten carbide; should be supplied with dimensional conformity certificate	
- Cleaning Tools & Cleaning cream	
- Go-No-Go Gauges for dies and piston	
- CRM with NIST traceable certificate	
Optional Accessories:	
- Die Plug	
- Windows based software	
- Die According to ASTM D1238 Method C (Half Die) , for high flow rate polyolefins, Dia 1.048 mm, Length 4.00 mm, - Made of tungsten carbide; should be supplied with dimensional conformity certificate	
Recommended Spares:	
- Spare Standard Die/Nozzle and Piston	
- Fuses and Thermal Probe	
The equipment should be supplied with all the essential accessories to meet the standard methods mentioned above.	

Shore A & D hardness Tester

Shore A & D	
Measurement range	0 ... 100 Shore A & D Units
Resolution	0.1
Accuracy	< ± 1
Indenter	35°± 0.25°
Memory	Saves up to 500 measurements
Standards	ASTM D 2240

Gloss meter

S.L. No.	Parameter	Specification/Range
1	Required angle	20°, 45°, 60°
2	Range (Gloss Unit)	0-2000
3	Repeatability	0.2 GU for 0 – 99.9 GU & 0.2% for 100– 2000 GU
4	Power Supply	230V & 50Hz

5	Equipment should meet the test methods	ASTM D-523, D-2457, ISO 2813, 7668, DIN 67530, JIS Z 8741, IS 2508
6	Calibration	Automatic, by means of built-in microprocessor
7	Measurement	Individual measurement & statistical evaluation
8	Memory	999 Measurement values with date & time
9	Digital Display	Alphanumeric LCD
10	Accessories	Calibration holder and standard tiles for 20°, 45°, 60° angles should be provided

Comparative Tracking Index		
1	Test Voltage	100 to 600 V AC (adjustable), 50 Hz
2	Trip Current	0.5 A, Pre settable
3	Short circuit Current	2.0 A
4	Voltage indicator	1/8 DIN, 3 Digit Voltmeter (100 - 600 V)
5	Current Indicator	1/8 DIN, 3 ½ Ammeter (0 to 2 A)
6	Dropping Unit	Automatic by special positive displacement pump
7	Drop interval	30 ± 3 sec.
8	Drop volume	20+5 cu.mm
9	Drop regulation	Mechanical
10	Drop Count	Pre settable digital counter (0-999)
11	Drop height	≤ 40 mm
12	Load on Sample	1.0 N
13	Electrodes	Brass & Platinum (40 mm long, 5 mm width, 2 mm thick and 30° Chisel point edge, 0.05 to 0.1 mm radius at the tip)
14	Power Supply	230V AC, 50 Hz
15	Test Confirming to	ASTM D 3638, ASTM D 5288, IEC 60112
16	Other Features	Transparent Lid should be provided which covers the test area, 4.0 mm thick space bar should be provided to adjust the electrode gap. Provision for Conductivity measurement of the solution should be provided.

HAZE & CLARITY METER

	Description	Specifications
1	Measurement range	0-100%
2	Resolution	0.10%
3	Repeatability	± 0.1 Units (standard deviation)
4	Reproducibility	± 0.5 Units
5	Diameter of port	20-30mm
6	Geometry	0° degree/diffuse (0° degree illuminating with diffuse viewing)
7	Confirming to	BS 2782 Part V methods –515A, ASTM D -1003, ASTM D -1004.
8	Accessories	Film sample holder Haze and clarity reference standard

Elmendorf Tear Tester		
S. No.	Name	Tentative Specifications
1	Capacity	0-6400 grams
2	Pendulum Range	400, 800, 1600, 3200, 6400
3	Accuracy	1.0% of pendulum range
4	Calibration Weights	20%, 50% and 90%
5	Measuring Principle	Hi-resolution digital encoder
<p>Features:</p> <ol style="list-style-type: none"> 1. Automatic specimen notching 2. Mechanical-pneumatic clamping avoids sample slippage to ensure repeatable results 3. Automatic pendulum reset with lifting device 4. Tearing force displayed digitally. 5. Safety Hood protects operator from injury while pendulum is in motion. 		
Calibration Certificates should be provided from NABL accredited lab		

PUNCHING PRESS		
	Base to guide - 171mm	
	Centre to back - 114mm	The specifications are indicative. Bidders shall specify their specifications of Punching press .
	Diameter of screw - 46½	
	Hole through base (without ring) - 76mm	The press can be hydraulic type with adjustable height; Max. height 500mm;
	Hole through base (with ring) - 38mm	Distance between columns : 300mm Min.

	Stroke - 114mm	Shall be supplied with Punching dies of the following type :
	Hole in ram (Dia.) - 19mm	
	Hole in ram (Depth) - 38mm	
	Diameter of flywheel - 536mm	
	Height of the body - 631mm	

OPACITY TESTER		
1	Type	Digital Opacity Tester
2	Range	0 - 100%
3	Least count	0.01%
4	Standard	IS 4985, IS 12235 with latest amendments
5	Optical filter wave length	540nm to 560nm
6	Standard calibration sample	CRM between 0.1% to 0.2 % transmittance with tractability to national & international

CONTOUR CUTTER		
1	High Cutting Speed.	1600 rpm with speed regulator
2	Standard milling cutter	For tensile, compression, flexural, impact test specimen Preparation from rigid plastics
3	Milling Performance	With depth of cut adjustment (0.05mm) & Easy Operation
4	Power Requirement	with dust collector by vacuum method.
5	Standard templates	Single Phase-15 Amp.
		as per ASTM & ISO standards.

MUFFLE FURNACE		
1	Controls	PID Based Digital Temp. Controller
2	Working Range	Up to 1000°C
3	Least Count	1°C
4	Accuracy	± 5 °C
5	Heating rate	Fast heating rate and the maximum temperature should be attained as a ramp function within 1 hour
6	Furnace	Fire Bricks Insulated Muffle Furnace. Door opening on front side. / Powder coated outer body
7	Chamber size (Minimum)	4 inches x 4 inches x 9 inches
8	Power Requirement	230V, 50Hz

9	Accessories	Standard accessories including silica crucibles, gloves, tongs etc.
10	Conform to standards	ASTM D 5630, ASTM D 2584, IS 4985, IS:12235

HOT AIR CIRCULATING OVEN		
1	Construction	Double walled outer body of SS 304 grade Inner SS 316 grade
2	Adjustable Trays	Stainless Steel with perforations Min. 3 trays with adjustable height
3	Insulation	Inner & Outer wall filled with thermal insulation material
4	Temperature range	Ambient to 300°C
5	Controller	Microprocessor based PID controller
6	Temperature accuracy	±1°C or better
7	Inner chamber Size	1mtr x1mtr x 1mtr
8	Powers supply	230 V AC, 50 Hz
9	Door	Right side opening, lined with asbestos gasket
10	Other Features	<ul style="list-style-type: none"> • High efficient air circulation from top to bottom should be provided with fan. • Provision for inserting the thermometer to verify inner temperature. • Moving wheel to be provided

DIELECTRIC BREAKDOWN TESTER		
1	To Measure Breakdown Voltage & Strength: ASTM D 149 &	
2	Maximum Capacity	100 kV
3	Electrodes	Brass Electrodes, Opposite cylindrical type of 25mm dia. and thick suitable for plastics, rubbers & laminates.
4	Meter range	Accuracy ± 5% of full scale.
5	Resolution	0.5 KV
6	Short Circuit Current	10, 15, 20, 25, 30, 35, 40, & 50 A
7	Voltmeter	0-25 / 10 – 60 kV
8	Rate of rise of Voltage	100 & 500 Volt/ sec
9	Test atmosphere	Air and oil
10	Test Temperature in Oil	Ambient to 100° C
11	Optional	Voltage stabilizer and UPS for matching the output of the system.

12	Others	Glass cover for the overall test station
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HDT / VSP APPARATUS (MICROPROCESSOR CONTROLLED)		
	No. of Stations	3 Stations
	Temperature Range	Ambient to 300°C
	Display for temperature & deflection	: Digital, LCD
	Measurement of deflection	Through LVDT
	Accuracy	±0.1°C
	Chamber material	Stainless steel
	Rate of Heating	120°C /hr & 50°C/hr
	Test Conforms to	ASTM D 648, ASTM D 1525, IS: 4985, IS:12235, IS:12818, ISO:75
	Load	For fibre stress of 4.6 kg/cm ² 18.4 kg/cm ² (HDT test) and 10
	Other Features:	
	Water cooling system should be provided to cool the oil after every measurement. Required volume of silicone oil should be provided.	

CARBON BLACK CONTENT TESTER		
1	Furnace	Tubular furnace with quartz glass tube Controller.
2	Furnace Dimension	Tube diameter : 32 mm and Length : 620 mm
3	Quartz Glass Tube	Length : 1050 mm : OD: 30 mm ID: 25 mm
4	Temperature range	ambient to 1000°C with digital controller
5	Accuracy	± 1°C
6	Control	With PID Based Programmable Digital Temp.

7	Power Requirement:	Single Phase : 15 Amp.
8	Conform to	ASTM 1603 and IS 2530

Accessories

1	Nitrogen flow meter with range 0 to 3 L/min & an accuracy of 0.1 L / min	
2	Complete Set of Glass wares for purging nitrogen in pyrogallol solution,	
	Provision for Cooling arrangement with dry ice;	
	U tube for desiccant for Nitrogen and glass wares for trichloroethylene.	
3	Quartz boats – 5 Nos (standard size)	
4	Spare quartz tube-1 no.	
5	Insertion tool and connecting silicone rubber tubes.	
6	Silicone rubber stopper for end closures of quartz tube – 2 Nos	

ENVIRONMENTAL STRESS CRACKING RESISTANCE (ESCR) APPARATUS

Constant temperature bath with lid.	Inside-SS, Outside : Powder coated MS with heat insulation, Lid: SS.
Heating System	Heater with digital temperature controller (PID)
Thermometer for bath	Ambient to 100°C (Digital)
Accuracy	±0.10°C
To maintain uniformity in temperature throughout the bath	Stirrer should be provided.
Blanking die for cutting specimen	38±2.5 mm x 13±0.8mm with ejector
Nicking Jig of lever arm with dial gauge	0-10 mm
Notch depth adjustment	0.30, 0.40, 0.50, 0.65 mm with notch length 19 mm
Bending cum transferring device	1 No.
Specimen Holder	SS (10 Nos.)
Test Tubes (Glass)	32 mm dia and 200 mm length (10 Nos)
Rubber Corks fit to the glass tubes	10 Nos.

Interchangeable notching blades	5 Nos.
Thermometer	1)50°C (20 to 60°C range) 2)100°C (60 to 105°C)
Test Conforms to	ASTM D 1693, IS 8747
Other features	Poly-oxyethylated Nonyl-Phenol / IGEPOL CO 630 (1 Lt) should be provided

FREE FALLING DART IMPACT TESTER WITH BUILT- IN VACUUM SYSTEM, FOR PLASTICS FILMS TESTING

Clamp	: Inside diameter of 127 mm, vacuum operated clamps with rubber gasket on both side. (Lower/Upper)
Dart holding device	: Electromagnetic releasing device
Masses	: SS masses of diameter 30 mm with a centre hole of diameter 6.6 mm and height varying from 2.5 to 25 mm (5g – 5 Nos., 15g – 24 Nos, 30g – 3 Nos, 60 g – 3 Nos,75 g- 2 nos, 100g- 5 nos.)
Dart Falling height	: Should be adjustable ranging from 0 to 2000 mm with 1.0 mm accuracy scale.
Dart	
(i) Low & medium impact film	: Hemispherical with diameter of 38.1 mm made out of aluminum.
(ii) High impact film	: Hemispherical with diameter of 51.0 mm made out of Stainless steel
Aluminum Shaft	: Length of 115 mm and diameter of 6.4 mm. Tip of length 12.7 mm is made out of steel
Test Confirms to	: ASTM D 1709 Method A & B, IS 2508, IS 13360

FALLING WEIGHT IMPACT TESTER FOR PIPE

1	Standards	IS 4985, IS 12818, IS 13592, IS 12235
2	Falling weight testing machine	Main frame with guide rail or tube fixed in a true vertical Position
3	Release Mechanism	Release mechanism with free fall from variable height up to at least 2 Meter with an accuracy of ± 10 mm
4	Max. Fall Height With calibrated scale	2050mm ± 10 mm
5	Suitable upto pipe size	630 mm

6	Mass of the Striker (kgs)	0.25,0.5,1.0,1.25,1.6,2.0,2.5,3.2,4.0,5.0,6.3
7	Material of striker	SS
8	Specimen holder for pipes	V Block with adjustable height. V' Block base size 300 x 300 mm 'V'Block base thickness 25 mm
		'V' Block Angle : 120 ⁰
9	Other features	Equipment shall have good workmanship and design to facilitate the easy operation with safety.
		The equipment shall operate in such a way that all strikes of a specimen shall be completed within 10 seconds.

FLAMMABILITY TESTER		
1	Chamber Inner Dimensions	
a	Width	120 - 125 cm
b	Height	125 - 130 cm
c	Depth	60 - 65 cm
2	Power supply	230 V, 50 Hz
3	Gas Pressure Gauge with regulator	0 – 30 psi
4	Digital timer	Range – 0 to 999 sec
		Accuracy – 0.5 sec
5	Methane glass flow meter	Range – 0 to 150 ml/min.
		Accuracy – 1 ml/min.
6	Confirm to	UL – 94, ASTM D 635
Features		
➤ Provision for specimen holder to test vertically and horizontally		
➤ Sliding door with transparent window moving up and down		
➤ Provision for fixing the burner at different inclination angle (0°, 20° and 45°) with lateral sliding mechanism		
➤ Temperature sensor for measuring flame temperature with digital indicator		
➤ Exhaust blower for evacuating the combustion products after test is required.		

Universal Testing Machine _ 10 tonnes (Fully computerised)		
S. No	Items	Specification
1	Control System	Microprocessor controlled
2	Maximum Load Capacity	100 kN
2	Cross head Travel distance	Min 1000 mm

3	Horizontal daylight	Min. 400mm
4	Cross Head Speed	
4.1	Minimum	0.5 mm / min
4.2	Maximum	1000 mm/min
4.3	Accuracy for Cross head speed	± 0.1 mm/min
5	Load cells	100 N, 1 kN, 10 kN & 100 kN
6	Load cell Accuracy	≤ 0.5 %
7	Grips & Fixtures	<p>Neumatic and Manual</p> <p>Tensile (suitable for plastics, rubber, film and fibre) compression, flexural, and shear fixtures.</p> <p>All fixtures should be suitable for low temperature testing and can be accommodated in to environmental chamber</p> <p>Rigid plastics (self lock winch grip, opening up to 12mm), plastic/composite rod (upto 12 mm dia) woven sacks (50mm width), rubber, fibre/filament.</p>
8	Test Conform to	<p>Tensile: ASTM D 638, ASTM D 882, and ISO 527</p> <p>Flexural: ASTM D 790 and ISO - 178</p> <p>Compression: ASTM D 695</p> <p>Shear: ASTM D 732</p>
9	Extensometer	Advanced Video Camera Extensometer - Non Contact Strain guage
10	Data Acquisition Rate:	24-bit resolution card with data acquisition rate of minimum 500 Hz simultaneously on load, extension, and strain channels.
11	Data Sampling Rate:	400kHz or better
12	Safety lock provisions	Limiting switch for cross head travel should be provided
13	Software	<p>(a) Software attached & data storage for sample test methods</p> <p>(b) Software should automates data acquisition, machine control, analysis, and reporting for a wide range of test requirements.</p> <p>(c) In addition, data compilation and provision for stress relaxation and creep shall be provided as per relevant ASTM Standards</p> <p>(d) Window's based graphical user interface.</p>
14	Essential Accessories	

14.1	Computer System	Computer with suitable configuration to support the software and colour bottled inkjet printers should be provided
14.2	Environmental Chamber	Environmental Conditioning Chamber temp. range : - 100° C to 300° C
14.3	Any other accessories required	Bidder should quote and supply any other accessories effective and better utilization of machine.
15	Calibration certificate	Calibration certificate for load cells and extensometer traceable to National / International Standards should be provided
16	Scope of supply	Bidder should submit complete scope of supply (Machine, standard accessories, Optional Accessories etc with make model) in the technical bid without price. Bidder should supply complete start up package including material necessary to prove the machine and provide training.
17	Terms & Conditions	<p>The bidder must have supplied machines at other Institutes in the past (a satisfactory performance certificate from those users may be solicited if needed). Bidder should submit complete contact details.</p> <p>Manufacturer of the supplied equipment must be ISO Certified</p> <p>Authorization Letter from OEM</p> <p>List of clients in last five years to be provided.</p> <p>Manufacturer/Supplier should have sizable installations of same model worldwide and at least Fives in India.</p>
18	INSTALLATION, COMMISSIONING AND TRAINING	
18.1	Installation and commissioning requirements	Bidder should state the space required and condition of floor and any other requirements for installation of the machine and equipments. State clearly the specifications of electrical requirement. Vendor should carry out installation and commissioning of the machine and its accessories on a turnkey basis.

18.2	Training and documentation	Minimum of 5 days training for five persons which includes basic & advanced level training. Training content and plan to be submitted. Training faculty must have adequate experience in this field.
		The vendor should supply the necessary manuals such as
		· Software instruction
		· Maintenance and trouble manual
		· Training
		· Installation and Commissioning
		· Handling of accessories
18.4	Technical support and service	Manufacturer should have established after sales & service network in India. The vendor shall have local service and application office and infrastructure to attend by visit within 48 hours of need. Technical support personnel must have adequate experience in this field. Technical support personnel details should be submitted. Name and address of the authorized service centre/ partner in India along with the certificate of authorization should be attached.

Hot Oil Bath		
1	Oil Bath Temp	150°C or higher
2	Timer	0-999 min
3	Timer accuracy	1 sec
4	Temp accuracy	± 1°C
5	Dimension L*B*H(min)	1000*750*750 mm
6	Should comply with IS 12235	
	Required volume of Transformer oil should be provided	
Calibration certificate should be provided from NABL accredited lab		

Arc Resistance		
S.No.	Specification	Requiemment
1	Voltage range	5 – 12.5 kV (50Hz)(Max.15 KV)
2	Auto Transformer	Adjustable to provide operating voltage of 12.5 kV
3	Current	5mA – 40mA

4	Timer Sec.	In-built digital timer with an accurate interval of 1
5	Automatic Interrupter	4 Steps 1/8,1/4,1/2 & 1
6	Interrupter Accuracy	± 1/120 Sec
7	Safety	<i>Micro-controller based control system. Enclosure with interlock switch for operator safety</i>
8	Electrode	Tungsten rod electrode Dia.: 2.4 mm, Length: 4.5 mm
9	<i>Trip Current</i>	<i>0.40mA, Adjustable</i>
10	Test Confirms to standard	ASTM D 495, IS 10810
11	Other	Voltage Indication: KV Voltmeter, 0 to 15KV Current Indication: 1/8 DIN, 31/2 Digit Ammeter, 0 to 2.000A Load on each electrode: 1.0 Newton Supply: 220 – 240V AC, 50-60 Hz, (user national standard if specified) Single Phase Max. Fuse Rating: 3A Rapid
Calibration certificate should be provided from NABL accredited lab		

Creep Tester		
S. No	Name	Tentative Specifications
1	Load capacity	10 k N
2	Test area depth	Unlimited
3	Test area-width between drive screws	1000 mm or specify
4	Test area-height	1000 mm or specify
5	Crosshead strokes	1000 mm or better
6	Lateral support of moving crosshead	precision sliding bearing on four hard chromium plated columns (40 mm diameter)
7	Test speed range	0.01 mm/h to 100 mm/min
8	Return speed	100 mm/min
9	Crosshead speed accuracy	+/- 0.1 % of setting (no load or constant load averaged over 10 mm or 5 s)
10	Resolution of stroke encoder	0.003 μ m or specify
11	Should meet their requirement of IS 16098	

Dust Chamber

Supply voltage	220V, 50 Hz (other optional)
Power consumption	max. 3000 VA
Heater	150 W or better
Depression turbine	1100 VA
Dust circulation turbine	1100 VA
	0,06 – 10 m ³ /h
	±3% for flow from 0.06m ³ /h to 0.12m ³ /h or specify

Air flow totalizer 1	±2% for flow from 0.12m ³ /h to 10m ³ /h or specify
Air flow totalizer 2	0,016 – 6 m ³ /h, ±3%
Depression sensor	Huba-Control 694.917015010
	0-50 mbar = 4-20 mA
	max. permissible 200 mbar
DEPRESSION INSTRUMENT	DAT-CON DI-10
Timer	accuracy 0,5%
Inner dimensions	Width 800 mm
	Depth 800 mm
	Height 900 mm

The equipment Should comply IEC 60529, 60068-2-68 La2, 61558-1, 61386-23, 60598-1, BS EN 60529, IS 12063 and IS 13947

Vibration Table

Sr. No	Specifications
1	Power: 3 HP.
2	Sheet Thickness: 12 mm.
3	Size: 2.5 FOOT x 10 FOOT.
4	Maximum Height of The Tile: 100 x 100 mm.
5	Frequency should be adjustable of vibration.
6	Total Weight: 350 kg / Piece.
7	Types Available: Tubular, Perforated.
8	Machine should comply to IS 14625
9	Calibration Certificates should be provided from NABL accredited lab

Flex Tester

Sr. No	Specifications
1	Stroke : 80 or 155mm
2	Twist : 400° Short stroke
3	Twist : 440° Long stroke
4	Counter for oscillations
5	Totaliser
6	Home Switch
7	Stainless Steel Cutting Template: 280mm x 200mm
8	Machine should comply to ASTM f 392
9	Calibration Certificates should be provided from NABL accredited lab

Izod/Charpy Impact Tester for Plastics

	The machine should offer following key features	
	Machine Design	

	<input checked="" type="checkbox"/> Microprocessor based instrument to automatically calculate and display impact energy absorbed by a specimen. It should resolve energies less than 0.03% of the capacity of the pendulum.	
	<input checked="" type="checkbox"/> With the proper selection of accessories, machine should perform Izod & Charpy tests in accordance with	
	ASTM D256 & ISO 180 (Izod Impact)	
	ASTM D6110 & ISO 179 (Charpy Impact)	
	ASTM D950 (Adhesive bonds) and other similar standards	
	<input checked="" type="checkbox"/> Easy switching between tests by choosing appropriate striking bit	
	<input checked="" type="checkbox"/> Aerodynamic compound pendulum with facility to increase/decrease pendulum capacity with addition/removal of weights enabling user to change to desired capacity quickly & easily	
	Display	
	<input checked="" type="checkbox"/> Should offer simple machine configuration and setting test parameters through display	
	<input checked="" type="checkbox"/> Selectable energy units of J, in.lbf, ft.lbf, kgf.m, kgf.cm	
	<input checked="" type="checkbox"/> Selectable strength calculations in ft.lbf/in, J/m, kgf.m/m, KJ/m ² , in.lbf/in, kgf.m/m ²	
	<input checked="" type="checkbox"/> Should offer break type input options	
	<input checked="" type="checkbox"/> Should provide real time display of energy	
	<input checked="" type="checkbox"/> Simple calibration routine which should automatically calculate the Windage and Friction losses	
	<input checked="" type="checkbox"/> Facility to set Upper and Lower Limits for Energy and Strength	
	<input checked="" type="checkbox"/> Toss Correction for low energy specimens should be implemented automatically or by keypad entry	
	Technical Specifications	
	<input checked="" type="checkbox"/> Basic pendulum capacity: 2.82J, with addition of weights, user should be able to change it to 25J (Standard), 50J (optional)	
	<input checked="" type="checkbox"/> Drop Height: 0.61m	
	<input checked="" type="checkbox"/> Impact velocity: 3.46m/s	
	<input checked="" type="checkbox"/> Power: 220V/50Hz, single phase	
	<input checked="" type="checkbox"/> Communication: should be provided for the output of test data to a serial printer or computer	
	Charpy setup	
	Should include Charpy striker, anvils, setting gauges & supports as per ASTM D6110 & ISO 179	
	Izod setup	

	Should include Izod striker, setting gauges & supports as per ASTM D256 & ISO 180
	Add-on Weights
	Various weight sets upto 25J capacity (ISO & ASTM methods)
	Certification
	Calibration/verification certificate issued by UKAS or A2LA or any other international body
	Optional Accessories
	should offer facility for zero & subzero testing upto -600C
	should be able to provide automatic specimen notcher to produce a notch in accordance with ISO 179, ISO 180, ASTM D256 & ASTM D6110. It should use single tooth diamond cutter to notch 28 specimens (3.2mm thick) simultaneously. It should feature air cooling system to reduce risk of thermal degradation

Xenon Test Chamber

Should be completely automated and capable of operating continuously with following facilities:

Sl. No.	Technical Specifications
1	Light source - Air cooled Xenon Arc Lamps
2	Sample compartment – Approx. 3000 Sq. cm or more
3	Microprocessor control required
4	Touch screen/key pad
5	Irradiance control required
6	Irradiance Sensors at 340nm, 420 nm & TUV range
7	Irradiance Calibration device for quick, easy, error free and automatic calibration
8	Optical Filter system to simulate outdoor / indoor testing
9	Filters should be of non-ageing type to avoid frequent change
10	Black Panel Temperature (BPT) Control
11	Black Standard Temperature (BST) Control
12	Chamber Air Temperature Control
13	Simultaneous control of BST & CAT required

14	Relative Humidity Control required
15	Provision of water spray front & back required
16	Data logging interface along with software
17	Capability of mounting and testing three dimensional specimens
18	Compliance to various international standards (ISO, ASTM and other standards)

(B) Optional Accessories:

Sl. No.	Technical Specifications
1	Specimen holder set for Xenon test chamber.
2	One Set of Xenon Arc Lamps for Xenon test chamber
3	Other types of Filters (Window glass, UV/Extended UV) for Xenon test chamber
4	Suitable Radiometer for optional filters for Xenon test chamber
5	Black Panel Calibration Thermometer for Xenon test chamber
6	Provision for back spray and dual spray in xenon test chamber

Notch Cutter	
	The Notch cutter should be capable of cutting Notches on Pipe samples as per Indian and International standard requirement

Projection Microscope	
	Suitable for thickness measurement/flow path measurement.
	suitable for distance measurement between ribs of emitters, fitted in inline emitting pipes, as per IS-13488 standard

Hot Air Oven

S. No.	Name	Tentative Specifications
1	Oven capacity	1000 litres or better
2	Temperature range	10°C to 350 °C
3	Accuracy	± 0.1 °C
4	Uniformity	± 1°C
5	Temperature sensor	Room temp to 350 °C
6	Control	Microprocessor based PID control

7	RH sensor	Direct capacitance type
8	Air circulation	Flange motor with impeller/blower
9	Construction	Double wall, with insulation, outer door key lockable, inner glass viewing door.
10	Chamber illumination	Fluorescent light with door switch

Deep Freezer

S. No.	Name	Tentative Specifications
1	Temperature Control	Microprocessor
2	Display	LED
3	Internal Volume	500 lt/1000 ltr
4	Temperature	Ambient to -40 °C
5	Internal Body Material	Stainless Steel AISI 304 Grade
6	External Body Material	Powder Coated CRCA Steel
7	Insulation	120 mm minimum, CFC free polyurethane foam
8	Recorder	Seven Days Circular Chart Recorder
9	Noise Level	Less Than 65 db (A)
10	Battery Backup	Sealed Maintenance Free Battery (For display, chart recorder & alarm only)
11	Power Failure Alarm	Audio Visual Alarm
12	Recommended Line Voltage Corrector	5 KVA

Features:

There should be a refrigeration system with high density PUF insulation, in the freezer for cooling down the temperature quickly

Resistance to Dichloromethane Test Apparatus	
	The Set up should meet the the requierement of IS 13592

UV weathero meter

S. No	Items	Specification
1	Applications	To simulate, accelerate and correlate the artificial sunlight / weathering atmosphere for polymers, coatings, etc.
2	Effective radiation area	4000 cm ²
3	Components surface temperature	45°C to 80°C for UV Cycle
4		45°C -60°C for Condensation
5	Temperature accuracy	± 0.1°C or better

6	Temperature resolution	1°C or better
7	Temperature controller	Black Panel Temperature
8	Centre distance of lamp	5 cm
9	Humidity	100%
10	Light source	UV-B Fluorescent Lamp
11	Wavelength	UVB (313 nm)
12	Minimum sample holder plates	Aluminum Plates 24 sample holders
13	Conditioning cycle	Light cycle and Condensation cycle
14	Irradiation Control	Irradiation control (solar eye automatically maintain light intensity through feedback look this controller monitor UV intensity and compensate lamp aging or any other variability by adjusting power to the lamp) with NIST traceability
15	Conforms to standards	ASTM G151, ASTM G 154, ISO 4892 (1 – 3), SAE J2020
16	Optional Accessory	Space saver frame
17	Warranty	Minimum 3 years of warranty to be provided
18	Scope of supply	Complete list of items quoted are to be provided
19	Installation requirements	Bidder to specify the preinstallation requirements
20	Training	Onsite training for system operation and maintenance as well as application support should be provided by the vendor at its own cost.
21	Service	Appropriate tool box/kit for routine maintenance should be provided with the equipment
		All documents (i.e. operating & service manuals, drawings etc.) and original softwares relevant to the instrument and its accessories must be supplied.
		In case of any up gradation of software within the period of warranty then the same should be provided free of cost by the supplier/manufacturer.
		Power and receptacle/socket as per Indian Standards should be provided.
		The vendor shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
		The vendor should have technical support in the area of application and service available within the country

FTIR

S. No.	Parameter	Specification
	Accepts	ID Accessories; Foundation Accessories; Many standard accessories
	Applications	Academic teaching, industrial QA/QC, plastics and polymers, pharmaceuticals
	Humidity	Tightly sealed to resist ambient humidity.
	Width (English)	13.5 in.
	Width (Metric)	35 cm
	Interface	PC USB 2.0
	Beam Splitter	KBr/Ge mid-infrared optimized
	Laser	Temperature controlled solid-state near-IR diode laser
	Performance Verification	ASTM E1421 to meet customer ISO/GLP requirements,
	Components	User-replaceable: source, desiccant, power supply, sample compartment windows
	Power Supply	100-240V 50/60Hz
	Depth (English)	10.9 in.
	Depth (Metric)	28 cm
	Source Type	Mid-infrared Ever-Glo; user replaceable from bottom plate
21	Detector Type	Fast recovery deuterated triglycine sulfate (DTGS) (standard)
22		

TGA Apparatus

Features	Parameter	specification
Design		A vertical design with a high sensitivity balance and quick response furnace. The balance is located above the furnace and is thermally isolated from it. A precision hang-down wire is suspended from the balance down into the furnace. At the end of the hang-down wire is the sample pan. The sample pan's position is reproducible.
Balance	Sensitivity	0.1 µg
	Capacity	1300 mg
	Accuracy	Better than 0.02%
	Precision	0.01%
Temperature	Furnace	
	Range	-20 °C to 1200 °C
	Scan rates	0.1 °C/min to 500 °C/min
	Precision	±1 °C
Cooling	Method	Forced air cooled with an external fan
	Cycle time	1100 °C to 50 °C
Sample Pans		Platinum or ceramic (60 µL)

Volatiles Analysis	Optional	AccuPik accessory pierces a hole seconds before the run to avoid evaporation and change in volatiles content
Atmosphere	Sample environment	Static or dynamic, including nitrogen, argon, helium, carbon dioxide, air, oxygen, or other inert or reactive gases. Analyses done at normal or reduced pressures.
	Gas Control	Balance purge (Mass-flow controlled); Sample purge (switch between 2 gases; Mass-flow controlled); Reactive purge
	Gas Mixing (optional)	Up to 3 gases
	Vacuum	10-5 Torr
Machine should comply to ASTM E 1131		
Calibration Certificates should be provided from NABL accredited lab		

GAS CHROMATOGRAPHY (GC)		
Preamble: To determine Vinyl Chloride monomer (VCM) content in PVC resin as per IS:10151		
Technical Specifications		
	Oven	The Column oven has an operating range of ambient to 450°C.
		Heat up time from 50° C to 450° C within 5 minutes (230VAC Version)
		Cool down time from 450 deg. C to 50 deg. C in less than 5 minutes.
		Heating Rate settable from 0.10 deg. C /min to 110° C /minute with at least 9 Ramps/10 plateaus.
	Split / split less Injector – 01 no.	The injector is able to operate with capillary wide bore and packed columns.
		The injector features an optimized, modular thermal profile for Split and splitless injection with a cold head.
		The injector allows timed closure/opening of the purge line.
		Maximum Temperature : 400°C
		Split Ratio : up to 10,000:1 or better.
		Pressure Range : 0-100 PSI or better
		Total Flow Setting
		Control of Split flow in 1 ml/min from 0 to 125 ml/min
		Control of Purge Flow 0 to 50ml/min

	Detector	The GC must have complete integrated control of all parameters for the following detectors FID & TCD - Detector must be fitted with the instruments (Mandatory) NPD, ECD (Optional)
	Flame Ionization Detector	Flameout detection and automatic re-ignition
		MDL : 1.5pg C/S or better.
		Sensitivity : >0.03 Coulombs/gC
		Linear Dynamic Range : >106
		Maximum Temperature : 450°C in steps of 10°C.
		Data Acquisition Rate : 200 Hz or Better.
		Signal filtration: 50, 200, 800 m.sec.
		Input range: -1 to 20
	Thermal Conductivity Detector	Capillary column compatible
		Proven Constant current design, Software protection to prevent filament burnout
		Ideal for series operation
		1/8-in fittings
		PPC pneumatics - software flow control of reference gas
		Operating temperature: 100°C to 450°C in steps of 10°C.
		Sensitivity : 9µV/ppm nonane at 160 mA at the bridge with a detector temperature of 100°C
		Minimum Detectable quantity: Typically < 1 ppm nonane
		Power Supply: Constant current with 4 selectable settings: ±40 mA, ±80 mA, ±120 mA, ±160 mA,
		Linearity: > 105
		Signal filtration: 50, 200, 800 m.sec.
		Filament production: Self limiting & resetting after transient overloads in either channel
		Make up gas: Required for 0.25 mm of smaller. i.e. Columns autosampler independent.
	Software	Latest 32/64 Bit Software for complete control and data acquisition from GC .
		It should be able to collect data from 2 detectors simultaneously.
		It should be upgradable to control 2 or more GC in future.

		It should have all routine chromatography functionalities like full GC parameter, setting, viewing Chromatograms, calculation based on % area, Area normalization, External standard, internal standard etc. Viewing of calibration curves, addition and subtraction of chromatograms etc., internal standard etc. viewing of calibration etc.
	Head Space Sampler	Head Space Sampler either by Transfer line technique or heated Syringe base technique.
		Sample Tray have Capacity of more than 40 Samples.
		Incubation temperature 200° C or better with at least 6 Vials or more Simultaneous heating capacity with overlapping mode.
		Syringe Temperature should be up to 150° C or transfer line temperature must be 200° C or better.
		Head Space sampler with Auto dilution, Standard preparation facility is preferable .
		It should be compatible with 10 or 20 ml vials.
		It should have built-in constant temperature mode, multiple Headspace extraction mode and mode for optimization method parameters (Progressive mode)
		Injection Volume Range settable from 0.1 to 5 ml
Note : Require accessories like screw vials, Vial caps, Sampling Vials total of 500 Nos. and		
	Optional Accessories.	
	Auto Sampler	Should have Vial capacity of 50 or higher.
		Should possible to use ALS and HS on the same inlet, if not possible then please quote one extra set of FID and SSL.
Note –		

Burst Strength		
S.No.	Specification	
	Mullen type of hydro-static digital burst strength tester For film, Aluminum foil, Specifications: Machine designed and working principal as per ASTM D-3786	
1	Pressure range	60 Kg/cm ²
2	Least Count	0.05 kg/cm ²
3	Display	Digital
4	Rate of Fluid Dispalcement	100 cc/minute
5	Test fluid	Water
6	Motor	1/2 HP single Phase
7	Peak Hold Facility	Yes
8	Safety Switch	Yes
Features		
1	Digital Indication Of readings	
2	Equipment Should be completely Microprocessor based	
3	Tare facility Should be incorporated	
4	Peak Hold facility for keeping the maximum value in the memory	
5	Bright LED display	
6	Features Touch Control	
7	single push botton control	
8	memory to hold upto 10 tests	
9	Strong Griping clamp	
10	Grooved structure for test specimen holder to avoid sleepage and intact holding of specimen	
11	No sleepage in case of specimen tightened uniformly using oprating wheal	
Calibration certificate should be provided from NABL accredited lab		

) N & 50 N (VST test)